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## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

## Appendiceal diverticulitis, a rare relevant pathology: Presentation of a case report and review of the literature



Maria Leonarda Altieri<sup>a</sup>, Guglielmo Niccolò Piozzi<sup>a,\*</sup>, Pierluigi Salvatori<sup>a</sup>,  
Maurizio Mirra<sup>b</sup>, Gaetano Piccolo<sup>a</sup>, Natale Olivari<sup>a</sup>

<sup>a</sup> Thoracic and General Surgery Department, Ospedale Maggiore di Lodi, Largo Donatori Del Sangue 1, 26900 Lodi, Italy

<sup>b</sup> Department of Pathology, Ospedale Maggiore di Lodi, Italy

### ARTICLE INFO

#### Article history:

Received 28 October 2016

Received in revised form 16 February 2017

Accepted 16 February 2017

Available online 20 February 2017

#### Keywords:

Appendiceal diverticula  
Appendiceal diverticulitis  
Case report

### ABSTRACT

**INTRODUCTION:** Appendiceal diverticulitis is a rare pathology that mimics acute appendicitis. Appendiceal diverticula are classified into congenital and acquired with difference in incidence and pathogenesis. Appendiceal diverticulitis is often overlooked because of mildness of symptomatology with increasing risk of complications, such as perforation. Appendiceal diverticula are often associated to higher risk of neoplasm especially carcinoid tumors and mucinous adenomas.

**PRESENTATION OF CASE:** A 40-year-old caucasian male presented into Emergency Room with right lower quadrant pain associated with vomit, abdominal tenderness, fever and moderate leukocytosis ( $11.93 \times 10^9$ ; neutrophils 78.5%). Acute appendicitis was suspected and a surgical approach was chosen with a McBurney access. The removed specimen (Figs. 1 and 2) was 11 cm long with multiple hyperaemic and oedematous diverticular protrusions. The postoperative course was regular. Discharging was on 4th postoperative day in optimal clinical conditions. The histological examination (Fig. 3) showed acute inflammation of appendiceal pseudodiverticula with acute peridiverticulitis and abscess.

**DISCUSSION:** Currently, appendiceal diverticulitis is often overlooked with high risk of complications, above all perforation. Attention should be kept during the surgical procedure and the pathological examination in order to identify any associated neoplasm.

**CONCLUSION:** Appendiceal diverticulitis should be considered in adult male patients with right lower quadrant pain or tenderness. Accurate appendectomy should be performed in order to permit an appropriate pathological examination and possible associated neoplasm should always be searched through. Prophylactic appendectomy should be performed in case of incidental finding of appendiceal diverticula in asymptomatic patients in order to avoid the high perforation risk.

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## 1. Introduction

Appendiceal diverticulosis was first described by Kelynack in 1893 [1,2] and its classified into two types: congenital and acquired with an incidence respectively of 0.014% and 1.9% [3]. Acute appendiceal diverticulitis is reported as a rare cause of appendicitis with a frequency between 0.004% and 2.1% [4]. Appendiceal diverticulitis may mimic acute appendicitis, however it occurs in relatively older age (43 vs 29 years [5]). Symptoms are mild with frequent diagnosis delay and increased risk of severe complications as perforation (higher risk of mortality) [3,6–12]. Appendiceal diverticula are frequently associated with higher risk of neoplasm especially carcinoid tumors and mucinous adenomas [3]. We present a case of appendiceal diverticulitis evidenced in our Community Institute.

## 2. Presentation of case

A 40-year-old caucasian male presented into Emergency Room with right lower quadrant pain associated with vomit, abdominal tenderness, fever and moderate leukocytosis ( $11.93 \times 10^9$ ; neutrophils 78.5%). Acute appendicitis was suspected and a surgical approach was chosen with a McBurney access. The removed specimen (Figs. 1 and 2) was 11 cm long with multiple hyperaemic and oedematous diverticular protrusions. The postoperative course was regular. Discharging was on 4th postoperative day in optimal clinical conditions. The histological examination (Fig. 3) showed acute inflammation of appendiceal pseudodiverticula with acute peridiverticulitis and abscess.

## 3. Discussion

Appendiceal diverticula is a rare condition. General incidence is very variable in literature with Abdullgaffar et al. reporting 0.014%

\* Corresponding author.

E-mail address: [guglielmopiozzi@gmail.com](mailto:guglielmopiozzi@gmail.com) (G.N. Piozzi).



Fig. 1. View of the Appendix with full visible diverticula.



Fig. 2. Dimension of the appendix.

[4], Sohn et al., 3.7% [14] and Collins 1,4% (evaluating 50,000 autopsies and surgical specimen studies) [13]. Appendiceal diverticula can be classified into two histological types: acquired and congenital. Acquired diverticula are small (2–5 mm) pseudodiverticula (herni-

ation of mucosa and submucosa through a defect of the muscular layer) frequently located in the distal third of the appendix on the mesenteric edge. The congenital form is characterized by herniation of all three appendiceal layers through an histological normal wall. Congenital form its located on the antimesenteric edge of the



Fig. 3. Transversal histological section of an appendiceal pseudo diverticulum: M: mucosa; SM: submucosa; L: lymphatic nodule; ME: muscularis externa; P: peritoneum; A: appendicular lumen; D: diverticular lumen.

**Table 1**  
Appendiceal diverticular disease classification according to Phillips et al.

Microscopic typologies of appendiceal diverticular disease [7]	
Type 1	Primary acute diverticulitis, with or without acute peridiverticulitis
Type 2	Acute diverticulitis secondary to acute appendicitis
Type 3	Diverticulum without inflammation
Type 4	Diverticulum with acute appendicitis
Type 5	Chronic peridiverticulitis with acute appendicitis

appendix and its associated with other diseases as Patau syndrome (trisomy 13) [15].

The etiology and the pathogenesis of acquired appendiceal diverticulosis is unknown. Risk factors are: male gender, adult age (>30 years), Hirschprung's disease and cystic fibrosis [16]. The acquired form is the prevalent and has no association with colon diverticula [4,15]. In our specimen the diverticula were acquired with direct herniation of the mucosa and the submucosa through a defect of the muscular layer (Fig. 3).

According to Phillips et al. appendiceal diverticular disease classification (Table 1) [7] we evidenced a primary acute diverticulitis with acute peridiverticulitis.

Diagnosis is based on clinical evaluation but US scan can be useful if performed by skilled sonographers. Diverticula appears as round cysts with enhanced walls attached to an enlarged appendix. In case of doubt CT scan can be performed. Lee reported that it is possible to differentiate appendiceal diverticulitis from acute appendicitis by visualizing the inflamed diverticulum through CT abdominal scan [17].

Although appendiceal diverticulitis is still referred by some authors as a variant of acute appendicitis it is important to make an accurate diagnosis in order to consider the higher rate of complications such as perforation (33% vs 9,8% according to Yamana et al.) [5].

A correct diagnosis is important not only because of the higher complication risk but also for the higher risk of associated appendiceal neoplasms, especially carcinoid tumors and mucinous adenomas [3,18,19]. Dupre et al. reported 11 cases of neoplasia on a series of 23 patients with appendiceal diverticula (47.8% of total). Kallenback et al. [20] demonstrated a similar association between appendiceal diverticula and neoplasms (43.6%; 17 cases on a series of 39 patients) while Marcacuzco et al. had a lower incidence (7.1%; 3 cases on a series of 42 patients) [21]. It is recommended to execute an accurate evaluation of the appendiceal specimen when diverticula are evidenced in order to exclude possible concomitant neoplastic disease [18,22–24].

Appendiceal diverticula can resemble appendiceal mucocele [5] at the preoperative images, thus surgery should be performed safely in order to avoid rupture with consequent risk of peritoneal seeding and pseudomixoma peritonei.

According to our opinion a great consideration should be given to this rare pathology that is frequently misdiagnosed with more frequent acute appendicitis. Our case report is fully compliant to SCARE criteria [25].

#### 4. Conclusion

Appendiceal diverticulitis should be considered while visiting patients right lower quadrant pain or tenderness. Accurate appendectomy should be performed in order to obtain an appropriate pathological examination and possible coexistent neoplasm should be looked through. Prophylactic appendectomy should be performed in case of incidental finding of appendiceal diverticula in asymptomatic patients in order to avoid the high risk of perforation.

#### Conflicts of interest

All authors have no conflict of interest.

#### Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

#### Ethical approval

The patient has given his written consent.

#### Consent

The patient has given his written consent.

#### Author contribution

MLA and GNP drafted the article; MM analyzed the anatomical piece; PS, GP and NO supervised the writing of the paper. All authors read and approved the final manuscript. Maria Leonarda Altieri: Participated substantially in conception, design, and execution of the study. Guglielmo Niccolò Piozzi: Participated substantially in conception, design, and execution of the study, also drafted and edited the manuscript. Pierluigi Salvatori: Participated substantially in execution of the study. Maurizio Mirra: Participated substantially in execution of the study. Gaetano Piccolo: Critically reviewed the paper. Natale Olivari: Critically reviewed and supervised the manuscript, providing a great contribution.

#### Guarantor

Guglielmo Niccolò Piozzi M.D.

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